UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MAKOTO KOBAYASHI and HIROYUKI TAKAMATSU

Appeal No. 2006-1700
Application No. 09/830,434

ON BRIEF

Before FRANKFORT, BAHR and NAPPI, **Administrative Patent Judges**.

NAPPI, **Administrative Patent Judge**.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 of the final rejection of claims 11 through 13, 17, 18, 20, 21 and27 through 30. Claims 1 through 10, 14 through 16, 19, 22 through 26 and 31 have been canceled. For the reasons stated *infra* we affirm the examiner's rejection of these claims.

Invention

The invention relates to a polishing pad used to mirror polish semiconductor wafers. See page 7 of appellant's specification. Claim 11 is representative of the invention and is reproduced below:

11. A polishing pad used for polishing a semiconductor wafer while supplying a polishing agent onto the polishing pad in a mirror polishing process, wherein the polishing pad comprises a base layer formed of nonwoven fabric and a porous surface layer formed of foamed polyurethane, and a content of zinc oxide (ZnO) included in the polishing pad is 200 ppm or less at the ratio of zinc weight relative to the weight of the polishing pad

Reference

The reference relied upon by the examiner is:

Cercone et al. (Cercone)	6,044,402	Dec. 21, 1999 (filed Mar. 9, 1999)

Rejections at Issue

Claims 11 through 13, 17, 18, 20, 21 and 27 through 30 stand rejected under 35 U.S.C. § 103 as being unpatentable over Appellant's Admitted Prior Art in view of Cercone.

Opinion

We have carefully considered the subject matter on appeal, the rejection advanced by the examiner and the evidence of obviousness relied upon by the examiner as support for the rejection. We have, likewise, reviewed and taken into consideration, in reaching our decision, appellants' arguments set forth in

the briefs along with the examiner's rationale in support of the rejections and arguments in rebuttal set forth in the examiner's answer.

With full consideration being given to the subject matter on appeal, the examiner's rejections and the arguments of appellants and the examiner, and for the reasons stated *infra*, we sustain the examiner's rejection of claims 11 through 13, 17, 18, 20, 21 and 27 through 30.

Initially we note that appellants present arguments to all the claims rejected and also separate arguments directed to the group of claims 13 and 21 and the group of claims 27 through 30. Accordingly, we will separately consider the rejection as it applies to three groups of claims, the first group consisting of claims 11, 12 17, 18 and 20; the second group consisting of claims 13 and 21; and the third group consisting of claims 27 through 30.

Rejection of claims 11, 12, 17, 18, 20.

Appellants argue, on page 6 of the brief, that the admitted prior art and Cercone would not be combined. Appellants state:

> Cercone thus differs from the Admitted Prior art and the presently claimed invention in several respects, including (1) describing a sponge for cleaning, and the properties that should be associated with a cleaning sponge, instead of a pad for polishing and properties thereof, (2) describing an extraction process specific to polyvinyl acetal, and (3) describing a procedure for extracting metals such as zinc, but having no teachings regarding zinc oxide. In view of these significant differences, nothing in Cercone would have lead one of ordinary skill in the art to have applied the teachings of Cercone to the Admitted Prior Art.

On page 7 of the brief, appellants admit that Cercone makes mention of using a sponge in cleaning and polishing roles but asserts that the thrust of Cercone is directed to properties required in cleaning sponges made from polyvinyl acetal and is not relevant to polishing pads. Appellants assert, on pages 7, 8 and 9 of the brief, that there is no motivation to combine the references as Cercone is directed to extraction processes used on polyvinyl acetal materials and not a polishing pad made of a non-woven fabric base layer and a polyurethane foam porous surface layer. Further, appellants argue that the examiner has not shown that the extraction procedures of Cercone would have the effect of eliminating zinc oxide, as opposed to zinc metals as in Cercone, from a polishing pad. Finally, Appellants argue that there is no teaching in Cercone that suggests that any modification to the polishing pad of the admitted prior art is necessary.

In response the examiner finds, on pages 4 and 5 of the answer, that "Cercone et al. is directed to a method of cleaning a semiconductor using a purified conventional sponge." The examiner states that while Cercone teaches that the sponge is made of polyvinl acetal (col. 1, line 26) the teaching is

not limited to polyvinyl acetal, citing several sections of Cercone and U.S. Patent 4,098,728 (referenced in Cercone). Further, the examiner states, on page 5 of the answer :

> Appellant [sic] is not arguing or claiming a specific method of producing a polishing pad having 200 ppm zinc oxide, rather a polishing pad having 200 ppm or less zinc oxide and the teaching of Cercone et al. of reducing zinc to prevent damages caused by loose particulates would be a clear teaching to one of ordinary skill in the art, even though achieved through different procedures, to modify a polishing pad by removing zinc.

Further, the examiner reasons that even if Cercone does not specifically disclose using the pad for polishing, "if residue metals can damage a wafer during cleaning, they could damage it during polishing." Thus, the examiner finds that one would be motivated to modify a polishing pad of the admitted prior art to reduce the zinc content to be less than 200 ppm to prevent damaging the silicone.

We concur with the examiner. Claim 1 recites a polishing pad, made of foamed polyurethane, to polish a semiconductor wafer wherein a content of zinc oxide included in the polishing pad is 200 ppm or less at the ratio of zinc weight relative to the weight of the polishing pad. As the examiner states, claim 1 does not include a limitation directed to how the polishing pad is made such that the zinc oxide is below the range. Thus, appellants' arguments that Cercone's process is directed to removing zinc from polyvinyl acetal materials and not a polishing pad made of a non-woven fabric base layer and a polyurethane foam porous surface layer as claimed is not commensurate with the scope of claim 1. Cercone teaches that synthetic sponges can be shaped as pads and used to

clean materials such as semiconductor wafers (See column 1, lines 26-34). Cercone teaches that trace amounts of metals in the sponge can come out of the sponge and damage the surface that is being cleaned. (See column 1, lines 37-39). Further, as the examiner identifies, Cercone teaches that the extraction process can be used to purify other materials (See column 7, lines 37 –40). While Cercone does suggest that the "other materials" includes other polyvinyl acetal synthetic sponges, we do not find that this would limit the suggestion as Cercone clearly teaches that it is the residue in the sponge, not the sponge, which damages the silicone wafer. Thus, we find that Cercone teaches reducing zinc residues from synthetic sponges used on semiconductor wafers to reduce the damage to the wafer. Appellants have not presented convincing evidence that foamed polyurethane, such as that described by appellants' admitted prior art, is not a synthetic sponge. Thus, we concur with the examiner's finding that one skilled in the art reading Cercone would be motivated to remove zinc from the polishing pad of appellant's admitted prior art, to reduce the chance of damaging the silicone wafer when the pad is used on the silicone wafer.

In response to appellants' argument that Cercone teaches reducing the amount of metals such as zinc and not zinc oxide as claimed, the examiner states "it is noted that a pad modified by the teaching resulting in an amount of zinc of 2 ppm would meet the limitations, since there is no zinc, there is no compound of zinc, e.g. zinc oxide."

We concur with the examiner. Initially, we note that claim 1 contains the limitation "a content of zinc oxide (ZnO) included in the polishing pad is 200 ppm

or less at the ratio of zinc weight relative to the weight of the polishing pad." Thus, the claim recites measuring the amount of zinc oxide in the pad based upon the relative weight of zinc in the pad to the total weight of the pad.[1] Similarly, Cercone teaches that it is desirable to have the amount of zinc in the pad limited to 2 ppm and expresses a preference to have it at 1 ppm or less. (see column 4, line 49 and column 7, lines 29-31.) Clearly zinc is a component of zinc oxide, thus by reducing the total weight of zinc in the sponge to 2 ppm the amount of zinc residue such as zinc atoms in zinc oxide will also be reduced to 2 ppm or less. Thus, appellants have not convinced us of an error in the examiner's rejection of claim 11 under 35 U.S.C. 103 and we accordingly sustain the examiner's rejection of claim 11 and the claims grouped therewith, claims 12, 17, 18 and 20.

Rejection of claims 13 and 21.

> Appellants argue, on pages 9 and 10 of the brief:
>
> Each of claims 13 and 21 requires that the polishing pad not contain zinc oxide. There is no indication in Cercone that this result could be achieved. In tables 2 and 4 of Cercone, it is indicated that even after the rigorous extraction procedures described in Cercone, the polyvinyl acetal cleaning sponge still contains some amount of zinc. Following the Examiner's logic that apparently equates metals such as zinc with zinc oxide, Cercone indicates that a cleaning sponge not containing any zinc oxide could not be achieved.

In response the examiner states, on page 5 of the answer: "as clearly indicated in the Applicant's [sic] specification, for example polishing pad 'E' as

[1] See also Appellants' specification pages 26 and 27.

set forth in the Example 3, pads having no zinc compounds is defined by pads having 10 ppm or less, which is again met by the prior art teachings of 2 ppm or less."

We concur with the examiner. Claim 13 includes the limitation that "the polishing pad does not include zinc oxide." As appellants state every example of Cercone contains zinc and Cercone does not identify that all zinc, and by extension all zinc oxide be removed from the sponge. However, as identified by the examiner, appellants' specification, on page 31, indicates that a polishing pad having 10 ppm or less of zinc is considered to be a polishing pad having no zinc compounds. Accordingly, we find that Cercone's teaching of 2 ppm of zinc to meet the claim limitation. Thus, we sustain the examiner's rejection of claims 13 and 21 under 35 U.S.C. 103.

Rejection of claims 27 through 30.

Appellants argue, that in addition to the arguments directed to claim 11, which claims 27 through 30 depend upon, nothing in Cercone would suggest using Cercone's cleaning sponge to polish the surface of a semiconductor wafer.

We disagree. As discussed *supra*, appellants' admitted prior art discloses using a foamed polyurethane (a synthetic sponge) to polish a semiconductor wafer. Cercone teaches that residue in synthetic sponges can damage a wafer when used in cleaning the wafer. We find that one skilled in the art would recognize that if residue in a synthetic sponge could damage the wafer when cleaning it could also damage the wafer when synthetic sponges are used to

polish the wafer. Appellants have presented no convincing evidence to prove the contrary. Accordingly, we sustain the examiner's rejection of claims 27 through 30.

In summary, we sustain the examiner's rejection of claims 11 through 13, 17, 18, 20, 21, and 27 through 30 under 35 U.S.C. § 103. The decision of the examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a)(1)(iv).

AFFIRMED

CHARLES E. FRANKFORT)
Administrative Patent Judge)
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JENNIFER D. BAHR) BOARD OF PATENT
Administrative Patent Judge) APPEALS AND
) INTERFERENCES
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ROBERT E. NAPPI)
Administrative Patent Judge)

Oliff & Berridge, PLC
P.O. Box 19928
Alexandria, VA 22320

REN/ki